

### REMARKS

This communication is in response to the Office Action mailed on July 25, 2007.

#### **Claim Rejections – 35 U.S.C. § 103**

Claims 1-2, 7, 24-25 and 35 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Pighin et al. ("Synthesizing Realistic Facial Expressions from Photographs") in view of Simon et al. (U.S. Patent Application 2003/0223622), Lanitis et al. ("Automatic interpretation and coding of face images using flexible models") and Burky et al., while claims 44 and 47 were rejected based on the cited combination and further in view of Nielson (U.S. Patent 6,591,011).

With this Amendment applicants have amended each of the independent claims to include along the lines of those previously recited in claims 44 and 47; however with more clarity. In view of these amendments claims 2, 44 and 47 have been cancelled.

Referring to claim 1, as amended, this claim recites a computer-implemented method for rendering a single frame of a synthesized image. The method includes generating a geometric component corresponding to a selected image for the single frame based on identified feature points from a set of representative images. Each image of the set has the identified feature points. This claim has been clarified to recite that the reference images each have a corresponding reference image geometric component, where a geometric component is a dimensional vector of feature point positions.

The method also includes generating the selected image for the single frame from a composite of the set of representative images based on the geometric component. The selected image and each of the set of representative images includes a plurality of subregions defined adjacent to each other. Adjacent subregions share a common boundary. A desired geometric component is generated for each subregion and the composite of the set of representative images is based on the corresponding desired geometric component for each subregion. Moreover, the selected image includes a synthesized subregion for each subregion based on the composite which is rendered by projecting the desired geometric component into the convex hull of the corresponding reference image geometric components to obtain a set of coefficients, where a

coefficient is associated with a representative image, and wherein a texture of the subregion of the new image is based on combining the corresponding texture of the corresponding representative image as a function of each of the associated coefficients and blending at least some boundaries between adjacent subregions in the selected image. Support for this claim language is found at least at page 17, line 13- page 19, line 15. It should be noted that use of the term “desired” has been chosen so as to bring clarity to the claim. In view of this terminology, some of the dependent claims have been amended to use the same wording. Other amendments to the dependent claims have been made to provide clear antecedent basis.

As indicated above these new features are along the lines previously recited in claims 44 and 47 with more clarity. As reported in the Office Action, the features recited in claims 44 and 47 were not taught by Pighin et al, Simon et al. or Burky et al., while Nielson was cited at column 18, lines 35-66 for teaching the “image searching and remapping can be done in linear program form using convex hulls.” From the cited description of Nielson, it appears this reference is trying to ascertain the congruency of point sets S and Q for pattern matching. (See for example, column 1, lines 16-24; column 10, lines 16-23; and column 18, lines 52-54). Nielson refers to mathematics involving convex ideas at the cited passage; however, the nature in which Nielson is using this type of mathematics does not teach or suggest operations or use of convex mathematics as now recited by claim 1.

Furthermore it is submitted Pighin et al. cannot be used in any rejection, particularly in view of the amendments now made, due to the manner, at least, in which Pighin et al. generate texture for their synthesized image. The discussion is found in section 3 of Pighin et al. As stated on page 4, column 2:

There are two principal ways to blend values from different photographs: *view-independent blending*, resulting in a texture map that can be used to render the face from any viewpoint; and *view-dependent blending*, which adjusts the blending weights at each point based on the direction of the current viewpoint.

In section 3.1, Pighin et al. discuss the use of weight maps to obtain texture, the weight map taking into effect self-occlusion, smoothness, positional certainty and view similarity, while sections 3.2 and 3.3 describe use of the weight maps in View-independent texture mapping and

View-dependent texture mapping. It is stated that Pighin et al. has feature points, referring to Figs. 1(a) and 1(b), where dots are shown. However, these feature points are not used in obtaining texture (which there is no reference to the feature points), but rather only in Section 2 which relates to computing the mesh. The amendments to claim 1 clearly show how the “feature points” recited therein are used differently and in a manner that is not taught or suggested by Pighin et al.

Simon also does not teach use of the describing feature points in terms of a geometric component and using the geometric component of a subregion of a desired image to obtain the texture of the subregion based on use of the corresponding geometric components of subregions of representative images in the manner as clarified by the language of claim 1. It is clear that Simon discusses “feature points”, but Simon does not use these feature points in the manner as recited by claim 1, rather Simon is using them as identifying points of interest on an image. For example, at paragraph 44, Simon states:

[0044] At a default setup step 230 the system uses the location of the facial feature points to identify and segment different regions of the face, such as skin, eyes, nose, mouth, hair, facial hair, etc., and determine the appropriate default parameters for the enhancement filters. In the preferred embodiment the neck region is automatically segmented based on location of facial feature points.

Although Simon uses feature points to identify or segment the image, it does not teach or suggest basing a geometric component on the feature points and using the geometric component in a manner as recited by claim 1 to obtain texture for a synthesized image.

In view of the foregoing, it is respectfully submitted claim 1 is allowable. Independent claim 25 recites similar features as those discussed above with respect to claim 1 and thus is believed allowable for the similar reasons. Each of the dependent claims depend from either claims 1 and 25 and recite further features that when combined with the features recited in the independent claim from which they depend, or any intervening claims, recite further, separately patentable inventions.

Independent claim 35 has been amended to include aspects previously recited by the features of claims 36-39. However, limitations to “facial” and “blending at least some

boundaries between adjacent subregions" have been deleted from claim 35, which are believed unnecessary in view of the patentable combination of features that have been added. Claim 36 has been amended to recite that the image comprises a facial image. Allowance of claims 35, 36 and 43 is respectfully requested.

The foregoing remarks are intended to assist the Office in examining the application and in the course of explanation may employ shortened or more specific or variant descriptions of some of the claim language. Such descriptions are not intended to limit the scope of the claims; the actual claim language should be considered in each case. Furthermore, the remarks are not to be considered exhaustive of the facets of the invention which are rendered patentable, being only examples of certain advantageous features and differences, which applicant's attorney chooses to mention at this time. For the foregoing reasons, applicant reserves the right to submit additional evidence showing the distinction between applicant's invention to be unobvious in view of the prior art.

Furthermore, in commenting on the references and in order to facilitate a better understanding of the differences that are expressed in the claims, certain details of distinction between the same and the present invention have been mentioned, even though such differences do not appear in all of the claims. It is not intended by mentioning any such unclaimed distinctions to create any implied limitations in the claims.

In view of the foregoing, Applicant's submit that the present Application is in condition for allowance. Favorable action is requested.

The Director is authorized to charge any fee deficiency required by this paper or credit any overpayment to Deposit Account No. 23-1123.

Respectfully submitted,

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